UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/574,235	03/20/2007	Eishi Matsumoto	107348-00575	2154

4372 7590 12/04/2007

ARENT FOX LLP
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

EXAMINER	
GORMAN, DARREN W	

ART UNIT	PAPER NUMBER
3752	

NOTIFICATION DATE	DELIVERY MODE
12/04/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com
IPMatters@arentfox.com
Patent_Mail@arentfox.com

Office Action Summary	Application No.	Applicant(s)	
	10/574,235	MATSUMOTO ET AL.	
	Examiner	Art Unit	
	Darren W. Gorman	3752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/31/06, 11/17/06, 10/3/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The IDS forms filed on March 31, 2006, November 17, 2006 and October 3, 2007 are hereby acknowledged and have been placed of record. Please find attached a signed and initialed copy of each PTO 1449.

It was noted that no US Patent document corresponding to document No. 6,573,724 cited on the IDS filed March 31, 2006, exists. The Examiner has lined-through this citation.

It was also noted that US Patent Application Publication No. 2002/0063174 was cited on the IDS filed March 31, 2006 and on the IDS filed November 17, 2006. The Examiner has lined-through the duplicate citation on the November 17, 2006 IDS form.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "annular step" being provided "between the chamfer and a lower end of the valve seat hole" as recited in claim 5, must be shown or the feature(s) canceled from the claim(s). It is noted that only Figure 4 of the drawings shows an annular step (see reference number "43a"), however this annular step is not in the location recited in claim 5. Moreover, as further limited in claims 6 and 7, the annular step is formed to have either a tapered section or an arcuate section. It cannot be clearly determined in Figure 4 as to whether a tapered section or an arcuate section is depicted. Thus, since only one drawing Figure shows an "annular

step", then one or both of the limitations recited in claims 6 and 7 are not shown in the drawings. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Minor Claim Suggestions By Examiner

3. The following changes are recommended to improve clarity of the claims. The claims have been examined on the merits including the suggested changes below.

In each of claims 5-7, reference number "43b" is used to reference the "annular step" of the device shown in the drawings of the disclosure. The specification and

drawings use reference number "43a" to reference the annular step of the device. The Examiner recommends changing "43b" in each of claims 5-7 to "43a".

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 5-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 5, the recitation, "wherein at least one annular step is provided between the chamfer and a lower end of the valve seat hole communicating with the fuel diffusion chamber" is not consistent with the disclosure. The only representation of an annular step in the drawings is shown as step "43a" in Figure 4, which is clearly not located between the chamfer (45) and a lower end of the valve seat hole (7).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al., US Patent Application Publication No. 2002/0063175.

Kitamura et al. (see Figures 3,4 and 8) shows a fuel injection valve assembly having a valve portion; a valve seat member (3) with a conical valve seat (8) and a valve seat hole (7), the valve seat cooperating with the valve portion and the valve seat hole communicating with the downstream end of the valve seat; an injector plate (10) being joined to the valve seat member; a radially extending and flat fuel diffusion chamber (41) being formed between the valve seat member and the injector plate, and the downstream end of the valve seat hole opening in a central part of the fuel diffusion chamber; and a plurality of fuel injection holes (38) being bored in the injector plate so as to open in the fuel diffusion chamber; wherein the fuel injection holes are arranged so as to be radially outwardly separated from the valve seat hole. Further, as depicted in Figure 8 of Kitamura et al., it appears that the height of the fuel diffusion chamber is at least less than half the length of the valve seat hole, thus anticipating Applicant's equation recited in claim 1. Also, Kitamura et al. clearly shows a chamfer (no reference number) located between the valve seat hole (7) and the fuel diffusion chamber (41). Still further, as to the recitation, "wherein the fuel diffusion chamber is formed so that the height thereof decreases when going in a radially outward direction", it is noted that Applicant's drawings in the instant application (see Figures 2 and 4) merely show a downwardly turning curve at the radially outward ends of the fuel diffusion chamber. For the purpose of applying art to the claims, the Examiner is interpreting the shown curvature as the depiction of the recited fuel diffusion chamber being formed "so that the height thereof decreases when going in a radially outward direction", particularly since no other drawing in the instant application shows a fuel diffusion chamber having a decreasing height in a radially outward direction. Thus, in as much as Applicant's fuel diffusion

chamber is formed so that a height thereof decreases when going in a radially outward direction, Kitamura et al. having a downwardly turning curve at the radially outward ends of the fuel diffusion chamber (see Figure 8), anticipates Applicant's recitations.

Further, although at least one section of the fuel diffusion chamber of Kitamura et al. may very well have a height of between 20 to 110 um, Kitamura et al. does not expressly disclose a specific height or height range of any particular section of the fuel diffusion chamber. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form at least one section of the fuel diffusion chamber of Kitamura et al. to have a height of between 20 and 110 um, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955).

8. Claims 5-7, as well as the claims are understood by the Examiner, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al., in view of Kitamura, US Patent Application Publication No. 2004/0050976.

Kitamura et al. ('175) shows or renders obvious all of the recited limitations set forth in claim 3, however Kitamura et al. does not expressly teach forming at least one annular step in the fuel diffusion chamber, the annular step having a tapered section or an arcuate section.

Kitamura ('976) (see Figures 2 and 4) shows a fuel diffusion chamber (13) having an annular step (15) communicating with a valve seat hole (8), the step being formed in the upper wall of the fuel diffusion chamber and having an arcuate curve section at a

radially outward end (see Figure 4). Kitamura further discloses that the annular step causes "a fierce turbulent flow and diffusion of the fuel", thus providing "enhancements in startability and output performance of the engine as well as a reduction in fuel consumption" (see paragraph [0040]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fuel diffusion chamber of Kitamura et al. ('175) to include an annular step, such as the one shown by Kitamura ('976) in order to cause a fierce turbulent flow and diffusion of the fuel, thus providing enhancements in startability and output performance of the engine as well as a reduction in fuel consumption.

As to the annular step being formed so as to alternatively have a tapered section, it should first be noted that Applicant's specification does not disclose that forming a tapered section as opposed to an arcuate section in the annular step solves any stated problem or is for any particular purpose (see Applicant's specification, paragraph [0050]). Moreover, it appears that forming an arcuate shape section or a tapered shaped section in the annular step of Kitamura et al., as modified by Kitamura, would perform equally well in the fuel diffusion chamber.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have replaced the annular step of Kitamura et al., as modified by Kitamura, with an annular step having a tapered section, because such a modification would have been considered a mere design consideration which fails to patentably distinguish over the prior art to Kitamura et al. in view of Kitamura.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patents to Pace et al., Fuchs et al., Harata et al., Kitamura, and Xu, and US Patent Application Publication to Xu, are cited as of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darren W. Gorman whose telephone number is 571-272-4901. The examiner can normally be reached on M-F 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Shaver can be reached on 571-272-4720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Darren W Gorman
Examiner
Art Unit 3752

11/29/07
DWG
November 29, 2007